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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/864,105	05/23/2001	David Walter Rose	1320-050	2447

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EXAMINER

LU, TOM Y

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/864,105

Applicant(s)

ROSE, DAVID WALTER

Examiner

Tom Y. Lu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 7-21 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-4 and 7-21 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Request for Continued Examination filed on 5/13/2005 has been entered.
2. Upon entry of Request for Continued Examination, the amendment and written response filed on 3/31/2005 has been entered.
3. Claims 5 and 6 have been cancelled.
4. Claims 1, 7-11, 15, 18, and 21 have been amended.
5. Claims 1-4 and 7-21 are pending.

Response to Arguments

6. Applicant's arguments filed on 3/31/2005 have been fully considered but they are not persuasive.

The Wood reference (U.S. Patent No. 4,842,411)

Applicant asserts Wood does not teach the use of a reference signal as claimed in independent claims 1, 11 and 21, and the modification to Wood's system as to use a reference signal would not benefit Wood in any manner. Upon further review of specification, and in light of applicant's arguments, the examiner respectfully disagrees as follows: Wood does disclose a reference signal as indicated in the previous Office Action dated 1/13/2005, the image signal produced by CCD sensor 7 is the claimed "reference signal" since applicant never defines in the claims nor in the specification as to how the reference signal is obtained or when it is obtained. And it is understood in the art that when two image signals are correlated, one of the image signals can be defined as "reference signal", and in Wood's, the image signal produced by CCD sensor 7 is the reference signal. Additionally, since Wood's system by itself incorporates such

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reference signal, it would not require any modification as to this limitation. Moreover, applicant argues Wood does not teach the limitation of “discrete multiple ones of said patterns”. The examiner, on the basis of “broadest reasonable interpretation”, construes a period of projection bands is a pattern as shown in figure 3, since the projection is a continuous process, there are plural periods of projection bands or “multiple ones of said patterns”.

7. Applicant’s arguments, see Remarks, pages 16-18, filed 03/31/2005, with respect to the rejection(s) of claim(s) 16 under 35 USC 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Dufour (U.S. Patent No. 4,933,541).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-2, 7, 11-12, 15 and 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Wood (U.S. Patent No. 4,842,411).

- a. Referring to Claim 1, Wood discloses a surface-profiling method comprising:
projecting a two-dimensional pattern (see figure 3, note a period of bands are projected on the surface of object 1, column 3, lines 1-7) upon a surface at a first angle (see figure 1, the projection is located right above the object 1, the claimed angle herein is a 90-degree angle) relative to said surface, wherein said pattern has a length and a width, and is formed of alternating relatively lighter and relatively

darker regions of varying lengths (see figure 3, the width is in y-axis, and the length is in x-axis, the spaces between bands vary relatively); capturing an image of said pattern from a second angle relative to said surface (CCD sensor 4 captures the projected image pattern from a second angle, which is not 90-degree); processing said image to produce a profile of said surface (the image captured by the CCD sensor 4 is digitized by digitizer 21); producing an image signal in response to said image (digitized image 24 is produced); and correlating said image signal with reference signal corresponding to said pattern projected by said projecting activity to produce said profile of said surface (column 4, lines 63-65, the claimed "reference signal" is the image signal captured by CCD sensor 7).

- b. Referring to Claim 2, Wood discloses said projecting activity projects discrete multiple ones of said patterns (projector 13 projects multiple periods of bands on the surface of object 1); said capturing activity captures an image of each of said patterns (CCD sensor 4 captures an image of each period); and said processing activity processes each said image (processor 23 processes each captured image).
- c. Referring to Claim 7, Wood discloses partitioning said image into at least one image region, wherein one said image region is responsive to a portion of said pattern projected upon said surface (column 4, lines 14-15, the segments are the claimed "image regions", which are portions of the projected pattern); producing an image signal in response to said one image region (the digitized image segment is the claimed "image signal"); correlating said image signal with said reference signal configured to correspond to said image region to produce a correlation

signal (the corresponding points at column 4, line 18 are the claimed “correlation signal”); and determining, in response to said correlation signal, a relative height of said surface upon which said portion of said pattern was projected (based upon the corresponding points, the height of said surface, the depth, is determined, column 4, line 38).

- d. With regard to Claim 11, see explanation in Claim 1.
- e. With regard to Claim 12, see figure 3.
- f. With regard to Claim 15, see figure 1 and column 4, lines 6-31, the first camera is CCD sensor 4, and the second camera is CCD sensor 7. The images captured by two CCD sensors respectively, are correlated to determine the shape of the surface.
- g. With regard to Claim 19, see figures 1 and 3.
- h. With regard to Claim 20, see figure 3, and column 3, lines 18-19.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 3-4, 10, 13-14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood et al in view of Fukuhara et al (U.S. Patent No. 4,653,316). The arguments in Paragraph 8 above as to the applicability of Wood are incorporated herein.

- a. Referring to Claim 3, Wood discloses a system using projector 13 and sensors 4 and 7 to determine the shape of the surface of an object. However, Wood does not teach applying the system on detecting road surface. Fukuhara discloses a system using a projector 24B and cameras 22 and 23 to detect characteristics of the road surface to create transverse profile and longitudinal profile of the road surface (Fukuhara: column 1, lines 32-52). By applying Wood's system in road surface detecting environment as described in Fukuhara, the combination of Wood and Fukuhara teaches a projector is configured to effect said projecting activity, wherein vehicle is configured to move in a vehicular direction and said width is substantially perpendicular to said vehicular direction; a camera is configured to effect said capturing activity; and moving said vehicle over said surface in said vehicular direction while effecting the projecting and capturing activities so as to obtain the captured image. At the time the invention was made, a person of ordinary skill in the art would have been motivated to do this because Wood column 5, lines 54-58 teaches the scope of his invention is not only applicable to the surface of an object carried by a conveyor belt but to other fields as well, which implies it can be applied to road surface detection as described in Fukuhara.
- b. Referring to Claim 4, the combination of Wood and Fukuhara teaches repeating said projecting and capturing activities at intervals along said vehicular direction to obtain a series of said captured images; and deriving a profile of said surface in substantially said vehicular direction from said series captured image (Wood

column 2, lines 32-34, also see figure 1 for direction; Fukuhara: column 1, lines 32-52).

- c. With regard to Claim 10, see explanation in Claims 3, 4 and 8.
- d. With regard to Claim 13, see explanation in Claims 3 and 4.
- e. With regard to Claim 14, see explanation in Claims 3 and 4.
- f. With regard to Claim 21, see explanation in Claims 1, 3 and 4.

10. Claims 8-9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood et al. The arguments in Paragraph 8 above as to the applicability of Wood are incorporated herein.

- a. Referring to Claim 8, the only difference between Claim 8 and Claim 7 is Claim 8 calls for at least twenty-five image regions instead of at least one image region. Wood teaches his system partition the image captured by the CCD sensor 4 into plurality of segments, however, Wood does not explicitly states the number of the partition will be at least twenty-five. At the time the invention was made, it would have been an obvious matter of design choice to modify the Wood reference by partitioning the image into at least twenty five regions, since applicant has not disclosed that having at least twenty five regions would solve any stated problems or post any significant advantages.
- b. With regard to Claim 9, see explanation of Claim 8 and 5.
- c. With regard to Claim 18, although Wood does not explicitly disclose what kind of projector it is in his system, it would have been obvious to a person of ordinary skill in the art to recognize any kind of projector is suitable to Wood's system as long as the projector can produce a recognizable pattern to the image sensors. And it would have

been obvious to a person of ordinary skill in the art to use a stroboscopic projector upon requested.

11. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood in view of Dufour (U.S. Patent No. 4,933,541).

- a. Referring to Claim 16, Wood teaches the bands projected on the surface should be recognizable to be captured by CCD sensors. However, Wood does not explicitly teach said projector is configured to project said pattern with said relatively lighter regions of substantially a predetermined monochromaticity; and said camera is filtered to be sensitive to said relatively lighter regions of substantially said predetermined monochromaticity. Dufour at column 4, lines 21-34, teaches applying monochromatic light source as projector and putting an interference filter in front of CCD camera 28 to capture the monochromatic light pattern. At the time the invention was made, a person of ordinary skill in the art would have been motivated to adapt a monochromatic light source and an interference filter in Wood's system as suggested by Dufour because it helps eliminates the light noise, column 4, line 34 in Dufour.
- b. Referring to Claim 17, the combination Wood and Dufour teaches said projector comprise a laser; and said laser produces said relatively lighter regions of substantially said predetermined monochromaticity (column 4, lines 21-24 in Dufour).

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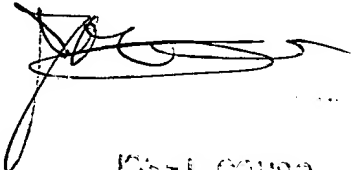
Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y. Lu whose telephone number is (571) 272-7393. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu



JOEL L. COUSO
PRIMARY EXAMINER